



Deloitte Resources 2019 Study

Energy management: Balancing climate, cost, and choice

Contents

Executive summary | 2

Residential consumers in a holding pattern | 6

Businesses move full speed ahead | 17

Concluding insights | 35

Endnotes | 37

Executive summary



The findings of the *Deloitte Resources 2019 Study* (“2019 Study” or “Study”) indicate that majorities of both the residential consumer and business segments continue to be concerned about climate change and reducing their carbon footprints. And both segments are interested in new and evolving technologies and applications to help them manage resources and use cleaner energy sources. But beyond that, the two groups diverge. Residential consumers are circling in a holding pattern, sometimes stymied by costs (time- and budget-related) or by the complexity or lack of options, while businesses are moving resolutely forward, becoming more sophisticated, achieving success, and upping the ante.

BUSINESSES SEE OPPORTUNITIES to create new value by conserving resources, diversifying energy sources, procuring renewables, and deploying energy management systems and applications. Residential consumers are doing the best they can, but for many of them, the value

proposition either isn’t there or isn’t clear. First adopters have already taken the plunge, while other consumers may be seeking warmer waters before they dive in.

Consider these residential consumer results from the 2019 Study:

- Sixty-seven percent of consumers are very concerned about climate change and their personal carbon footprints, in line with previous years.
- Keeping their total energy bills affordable rose five points to 63 percent in 2019, continuing to be the most important energy issue for residential consumers, while using clean energy sources fell slightly from 2018 to 50 percent, in line with prior years.
- Fourteen percent of residential consumers use a software app for energy management and 22 percent of them consult the app daily. For Millennials, the trend is more pronounced: 18 percent use an app and 29 percent use it daily.
- Among consumers who have not installed solar panels, roughly half would be interested in combining solar panels with a battery storage unit. The biggest hurdle for those who are not interested is uncertainty about the benefits of solar-plus-storage, at 34 percent.

Consider these key business results from the 2019 Study:

- While desire to cut costs is the top driver for resource management programs, cited by half of business respondents, just the “right thing to do” rose 11 points in 2019 to second place, at 39 percent.
- Eighty-four percent of respondents were aware of US and global climate change reports issued in late 2018 containing grave assessments.¹ Nearly two-thirds of those familiar with the reports reviewed or changed their energy management strategies in response, and 83 percent of those increased their commitment.
- Nearly nine in 10 reported having resource management goals, and the percentage that reported having formal goals rose nine points from 2016

to 63 percent in 2019, with a corresponding drop in those reporting informal goals.

- The percentage of businesses that reported allocating the highest degree of effort and resources to their resource management programs rose from 39 percent for 2016 to 67 percent for 2018.
- About two-thirds say their customers are demanding that they procure a certain percentage of their electricity from renewable resources, and a rising portion (72 percent) actively publicize their sourcing of renewables.
- Nearly nine in 10 (87 percent) reported participating in demand-response programs at least occasionally if available in 2019, up 8 points from 79 percent in 2017.

As these findings suggest, while businesses are still driven to manage resources for economic reasons, they’re increasingly motivated by climate change and sustainability as well. They’re paying attention to environmental issues and upping their game. They’ve set more ambitious resource management goals, increasingly in multiple resource areas (that is, electricity, natural gas, transport fuels, and water), and put more effort behind achieving them than in prior years. More businesses have formal resource management plans in place and they’re increasingly linking them to employee compensation. While initial cuts are getting easier and there are fewer barriers to progress, programs are also becoming more sophisticated. Results of resource management programs are improving and businesses are feeling their success. And that success is no longer the domain of large companies but has spread to many mid-cap and smaller companies, which are also upping the ante.

Many businesses are becoming more flexible in their approach to cutting costs, such as by boosting participation in demand response programs. And in response to customer demand for cleaner energy sources, nearly half of the businesses surveyed are

seeking to procure more electricity from renewable sources. This is consistent with prior years, but a rising percentage is actively publicizing their efforts. While most continue to favor simpler energy management tactics such as using sensors and timers on equipment, they're also looking to diversify energy sources and boost resilience and sustainability by turning increasingly to on-site generation.

Residential consumers share the business segment's concern about climate change and reducing carbon emissions, but many are being held back largely by cost and complexity. While businesses see resource management as a way to create value rather than as a cost, residential consumers still see affordability as a barrier to adopting new technologies and cleaner energy sources. What's more, the messages they're receiving about new technologies, alternate providers, and other options do not seem to be coming through clearly. Whether it's installing

solar panels, enrolling in green energy programs, or purchasing battery storage or electric vehicles, many residential consumers still see those options as too expensive. Or they don't understand how to access and implement them or what their benefits would be.

A growing exception is Millennials, who consistently rate clean energy and technology options higher than other age cohorts. Based on Study responses, they're more receptive to messaging about new products and services, more willing to try them out, and even potentially to pay more for cleaner energy sources if necessary. For incumbent electricity providers and new entrants, engaging and communicating effectively with residential consumers from this generation and like-minded residential consumers from all generations is a goal that could open opportunities to create value.

ABOUT THE STUDY

Deloitte², with strategy and market research firm YouGov America, has completed its ninth annual nationwide Resources Study to provide insights that can be useful in helping energy companies and businesses make energy-related investment and business decisions. The Study aims to answer questions such as:

- What are US residential consumers and businesses doing to manage their energy usage?
- How do they feel about carbon reduction and environmental responsibility?
- What motivates them to reduce their energy consumption and to implement clean technologies?
- How mature are their approaches to energy management?
- How can electricity suppliers and energy service providers better meet their needs?

The 2019 Study was conducted in February 2019, and thus, largely reflects attitudes and practices related to the year 2018. The Study captures two views: a residential consumer perspective and a business perspective. The residential consumer portion is based on more than 1,500 demographically balanced online interviews with household decision-makers for utility services. The business portion of the Study is based on 600 online interviews with business decision-makers responsible for energy management practices at companies with more than 250 employees across all industries. To facilitate in-depth analysis, business survey respondents are segmented by industry sector and company size. Please see figures 1 and 2 for definitions of these segments.

FIGURE 1

Sectors



Source: Deloitte Resources 2019 Study survey methodology.

FIGURE 2

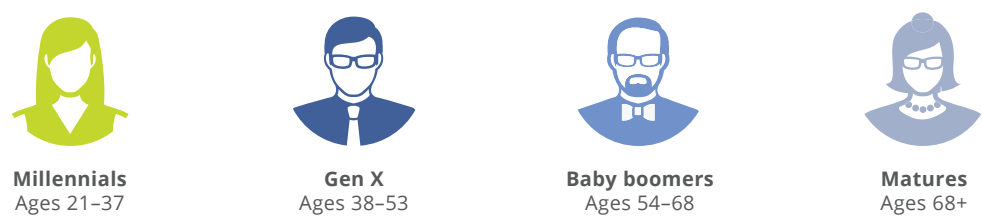
Company size



Source: Deloitte Resources 2019 Study survey methodology.

FIGURE 3

Generations



Source: Deloitte Resources 2019 Study survey methodology.

Residential consumers in a holding pattern

THE 2019 STUDY findings indicate residential consumers overall are in a holding pattern with respect to energy management attitudes, expectations, and behaviors. We observe a balance between drivers and enablers on the one hand, and challenges and obstacles on the other hand.

The main factors that seem to be motivating residential consumers to be more proactive with regard to their energy consumption come from a combination of strengthening awareness of climate risk and personal carbon footprints, together with a business environment that offers residential consumers more choices—choices of energy management technologies, of energy sources, of level of autonomy, and even of energy providers. And all of these factors are becoming more influential with younger generations of electricity buyers—perhaps an indicator of trends that will strengthen in future

decision-makers continue to seek more choice in energy sources and energy management solutions, and that more of these choices are becoming available.

On the other hand, more rapid progress in residential energy management seems to be inhibited by other factors. For example, many early adopters have already embraced technologies such as solar and electric vehicles often for lifestyle and ideological reasons, while the rest seem to be waiting for such actions to become easier and more affordable. The 2019 data indicates a slight overall dampening of enthusiasm for clean energy and energy management solutions. Immediate cost concerns may be delaying many residential consumers' willingness to move faster on greening their energy consumption and carbon footprint. Is this a sign of complacency, or is there a communications gap around what options are available and their cost?

By understanding and segmenting the customer base and targeting them with clear and compelling messages through the appropriate channels, electricity providers could potentially break through consumer complacency and expand adoption of new services.

years. For example, we found that sentiment on climate issues is still strong, with nearly two-thirds concerned about climate change and their personal carbon footprints. We also found that household

For electricity providers, inertia among residential consumers may, paradoxically, provide opportunity. Generational preferences for greener energy, more choice, and more appetite for technology could open markets for providers who can meet consumers where they are with the right messages. By understanding and segmenting the customer base and targeting them with clear and compelling messages through the appropriate channels, providers could potentially break through consumer complacency and expand adoption of new services. Providers should consider residential consumer concerns related to climate and cost, while also recognizing their desire for

choice and the need for clearer, more targeted communications. And finally, opportunities to revitalize this market aren't limited to incumbent electricity providers, but are increasingly open to new market entrants who are already changing the dynamics of the sector.

The story of our 2019 Study of residential energy customers can handily be told as a tale of four Cs—climate, choice, cost, and communications—balancing out change and opportunity on the one hand, with challenges and obstacles on the other. This tension between opposing forces slows energy management progress in the residential consumer segment, causing it to lag progress in what we see in the commercial, industrial, and general business segments.

Climate concerns continue to drive residential consumer energy choices

Nearly two-thirds of residential consumers expressed great concern about climate change, in general, and their own carbon footprints, in

particular. This has been a consistent finding in recent years (figure 4). And roughly three-quarters (73 percent) attribute climate change to human actions, also in line with prior years. This strong and consistent consumer attitude about climate and carbon is also supported by more specific survey responses:

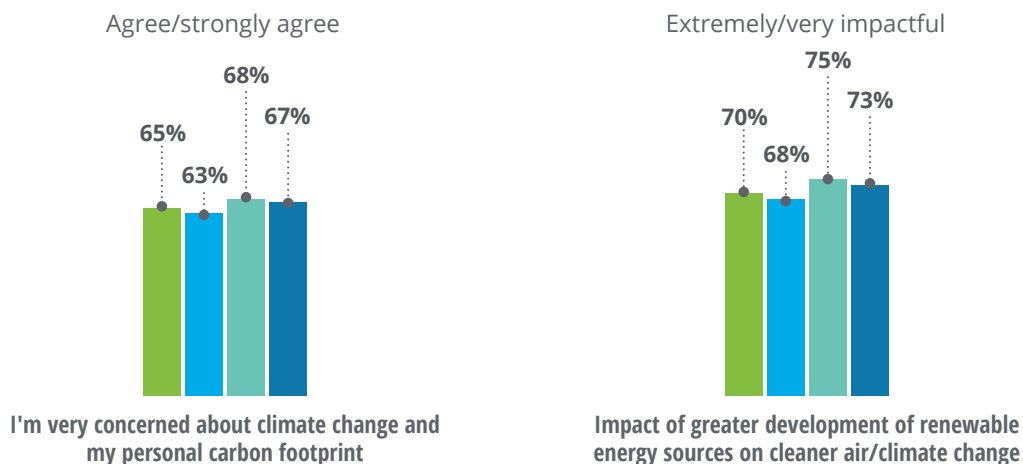
- 50 percent stated that using clean energy for better environmental stewardship was one of their most important energy issues, second only to energy affordability at the household level.
- A majority, 73 percent, saw clean air and climate stewardship as one of the most important drivers for the adoption of renewable energy (in a tie for first place with energy independence for the United States, see figure 4).

However, most residential consumers appear to believe that it is the government's responsibility to set the vision and path for US energy strategy, indicating that a more conducive environment for changes in consumer behavior and choice could be greatly facilitated by a strong lead from

FIGURE 4

Concern about climate change persists

■ 2016 ■ 2017 ■ 2018 ■ 2019



Source: Deloitte Resources 2019 Study survey results.

policymaking bodies. Perhaps progress to date in the cost, performance, and availability of greener energy technologies may not be enough in themselves to accelerate change in residential consumer behaviors.

This shortfall in translating attitudes into action shows up in survey responses to questions about the pace of adoption of renewable energy by households. There was a slight retrenchment by respondents in the importance given to renewable sources of electricity—back down to 48 percent from 53 percent in 2018, and back to the level we saw in 2016 (figure 5). This could be a case of affordability competing with climate concerns, a trend that emerged this year

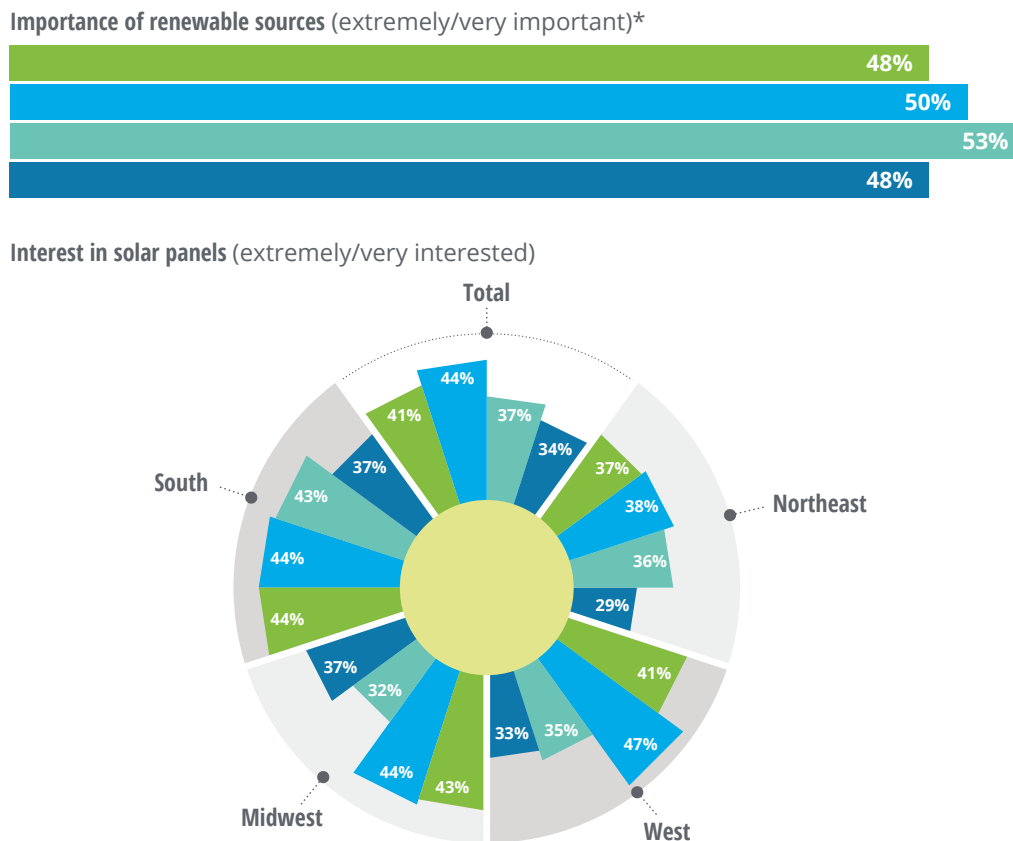
and is discussed further below. But, as a pointer to the future, younger generations were more likely to rate the importance of renewable energy sources as extremely or very important—53 percent of Millennials stated so, as opposed to just one in four in the Mature age cohort.

One way residential consumers can directly adopt renewable energy is by installing rooftop solar systems (for those that own single-family homes). However, here too we see behavior still lagging behind attitudes. Interest in installing rooftop solar fell from higher levels seen in 2016–17 (figure 5), perhaps because early adopters in the most favorable locations have already installed it, and others

FIGURE 5

Importance of renewable energy sources fell slightly

■ 2016 ■ 2017 ■ 2018 ■ 2019



*Importance of part of their electricity coming from renewable sources such as solar, wind, or hydroelectric.
Source: Deloitte Resources 2019 Study survey results.

who may be interested may be waiting for prices to decline further or for opportunities to buy into community solar or other green energy options. Consistent with prior years, 40 percent would be extremely or very interested in purchasing a share in a community solar project, and that interest is highest among Millennials, at 49 percent.

Expanding menu of choices also drives residential consumer action

A persistent thread throughout the 2019 Study is that residential consumers are interested in being offered more choices. As well as being a precursor to change in energy use, this desire could open doors for both incumbent electricity providers and new entrants—whoever can best meet consumers’ needs for reliable, affordable, and increasingly clean

energy. Some of the main areas where residential consumers would like to see greater opportunities to exercise choice are as follows:

- **Green energy.** In total, 94 percent of respondents said they have either not been offered the opportunity to buy “green” energy or they are not sure if they have (9 percent and 85 percent respectively). But almost half of those would like to be offered green energy, rising from 45 percent in 2018 (figure 6). And, of those, 31 percent stated they would be willing to pay more for green energy, but there’s a limit—only 14 percent would pay a premium of 15 percent or more. The portion who would like to be offered green energy rises to 57 percent among Millennials and 52 percent for Gen X respondents, again seeming to signal a possible generational shift in attitudes that might portend an acceleration of low-carbon energy usage in future years.

FIGURE 6

Nearly half would like to be offered green energy and some would pay a premium

■ Yes ■ No ■ Not sure

Like to be offered green energy?*

2019



Willing to pay a premium for green energy?



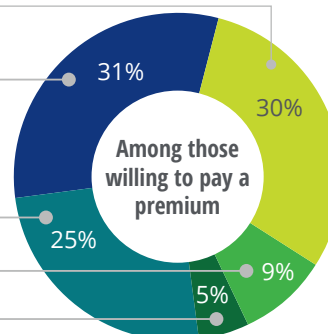
30% are willing to pay a 1–4% premium

31% are willing to pay a 5–9% premium

25% are willing to pay a 10–14% premium

9% are willing to pay a 15–20% premium

5% are willing to pay a more than 20% premium



*For those who have not been offered opportunities to buy green energy by their electric provider.

Source: Deloitte Resources 2019 Study survey results.

- Time-of-use rates.** For the second consecutive year, residential consumer interest in having the option to save money by utilizing time-of-use rates, where available, to shift power use to off-peak hours was still at almost half (46 percent), after having risen 14 percentage points in 2018 compared with 33–34 percent in 2016–17.
- Retail competition.** About 20 percent consistently report that they have a choice when it comes to electricity providers and, among those,
- Switching to renewables.** When considering switching providers, the most common option residential consumers would consider

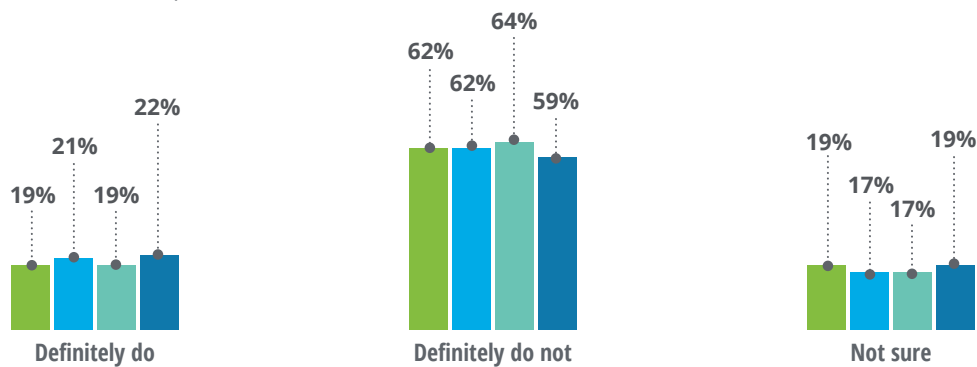
a consistent 43 percent report having switched providers. But there still appears to be some confusion, with nearly two in 10 “not sure” if they have a choice (figure 7), which may indicate a need for better communications about options and could in particular open up markets for new or nontraditional electricity providers.

FIGURE 7

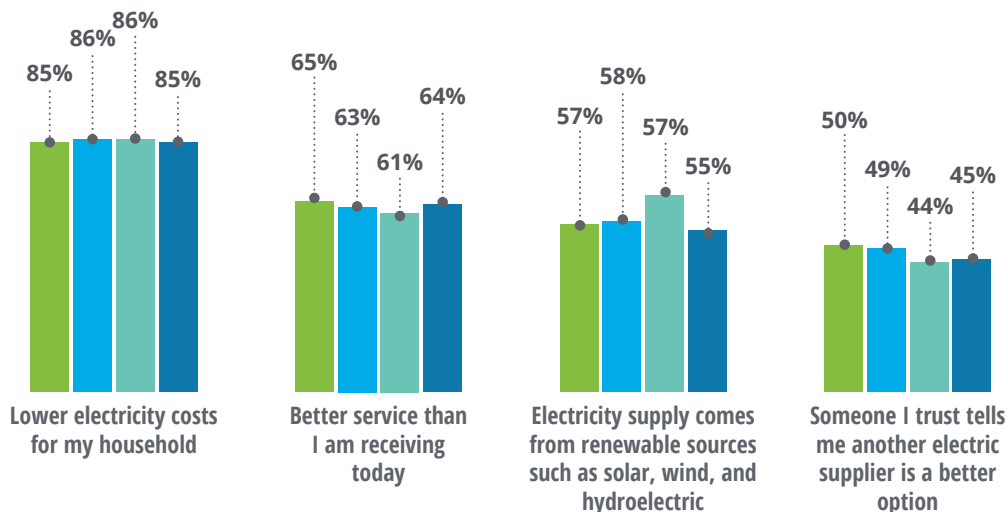
Residential consumers are confused about retail choice, but cost is key to switching

■ 2016 ■ 2017 ■ 2018 ■ 2019

Have a choice of providers



Motivations for switching (extremely/very motivating)



Source: Deloitte Resources 2019 Study survey results.

is renewable energy providers, at 57 percent reported. But that's down 6 points from 2018 and, again, the primary incentive to switch is cost, cited by 85 percent, ahead of getting more renewable power, at 55 percent (figure 7). So, even for those residential consumers motivated to reduce their carbon footprints, the offer would likely have to promise savings on their bills as well.

- **Nonenergy services.** While residential consumers are beginning to consider buying electricity from alternative providers, the majority does not want to buy other services from their utility. In a list of options, from cable TV to home automation, energy efficiency services (45 percent) and internet service (44 percent) were the only options to crack 40 percent by survey respondents, and 27 percent said “none of the above.”

Younger generations are slightly more open to new providers than others. So it looks like growing household appetite for choice should be favorable to new types and levels of competition in retail power.

Costs can hinder residential consumer action on energy management

When it comes to translating evolving attitudes into action, the cost of electricity and the costs of technology appear to be significant barriers to change, although the jury is out on whether cost concerns are allied with complacency, once “easy” behavioral changes have been made. The survey explored attitudes toward cost and how they impact residential consumer willingness and ability to change energy-buying habits.

Keeping total energy bills affordable and using clean energy sources have consistently topped the list of important energy issues for residential consumers in recent years, but 2019 saw a slight uptick in those who say keeping their total energy

bills affordable is important and a slight decline in the importance of using clean energy sources in general (figure 8). Together, these responses may indicate that affordability is increasingly a factor in residential consumers' energy choices, despite their concerns about the climate—and may be resulting in some complacency. Both survey responses and data for the population as a whole point out that consumers are experiencing rising electricity rates, with 45 percent of survey respondents reporting that they pay more than they did two years previously, which is consistent with US Energy Information Administration data that shows residential electricity prices rising by 2.88 percent between 2016 and 2018.³

Turning attitudes toward cost into action, roughly eight in 10 took steps to reduce their electric bill in the last year—and nearly two-thirds said that there isn't really anything incremental they can do to cut costs further, having already taken all the energy-saving steps they can identify (figure 9). It follows that households expect their household electricity consumption to remain about the same over the next year. And when it comes to spending money to save money, 30 percent say that lack of money to invest in energy savings is an important obstacle.

The least costly approaches to saving on electricity, such as turning off lights (cited by 81 percent) and shutting down electronics when not in use (67 percent) top the list of consumer energy management practices year after year, while those that require investment of time and/or money are less popular—such as replacing old appliances with energy efficient models (43 percent) and better insulating homes (36 percent).

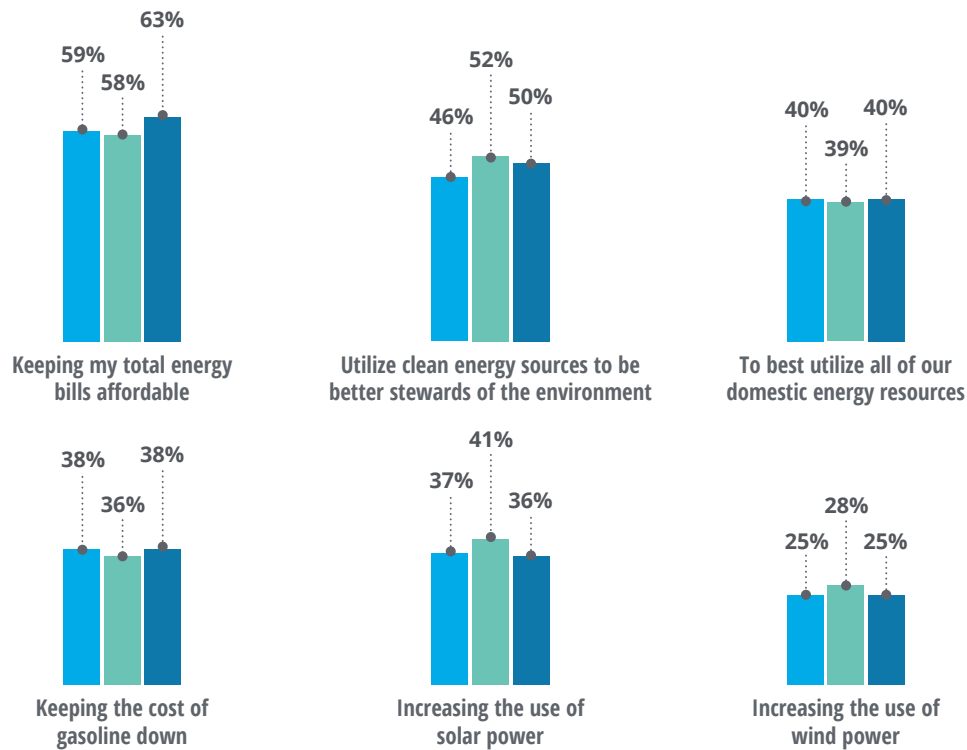
Even when considering switching providers, cost outweighs climate as a motivator, as does service (likely related to reliability). Eighty-five percent cited the importance of lower electricity costs and 64 percent cited better service, while getting their electricity from renewable sources came in third, at 55 percent. Savings of 20–25 percent are the average required to motivate a switch, but three in 10 would switch for less.

FIGURE 8

Residential consumer emphasis on costs rises, while clean energy sources fall slightly

Energy issues (top 3 issues most important to you)

■ 2017 ■ 2018 ■ 2019



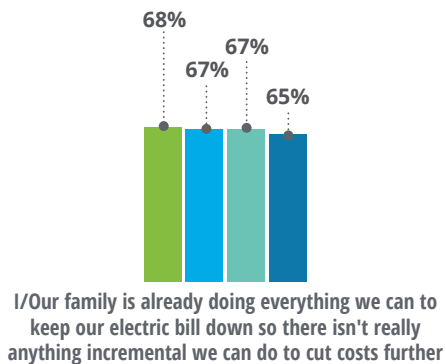
Source: Deloitte Resources 2019 Study survey results.

FIGURE 9

Consumers believe they are doing all they can to reduce electric bills

■ 2016 ■ 2017 ■ 2018 ■ 2019

Agree strongly/somewhat



Source: Deloitte Resources 2019 Study survey results.



We also see an affordability challenge cited by residential consumers who have chosen not to participate in green energy programs. Participation remains low, at only about 6 percent of those who have been offered green energy. Nearly half consistently cite expense as the top barrier, but this year the percent who said “current sources are perfectly acceptable to me” rose 9 percentage points to 32 percent from 23 percent—so some mix of cost and complacency may be in play here.

Targeted communications may provide an opportunity to impact residential consumer choices

Getting reliable information about electricity products and services is an important enabler to changing habits, energy sources, or suppliers, or adopting more advanced energy technologies. According to the 2019 Study, electricity providers continue to be the top source for tips on how to save energy, cited by 69 percent of our sample. A quarter of respondents get tips through social media, including a third of Millennial respondents, indicating this might be a growingly effective channel

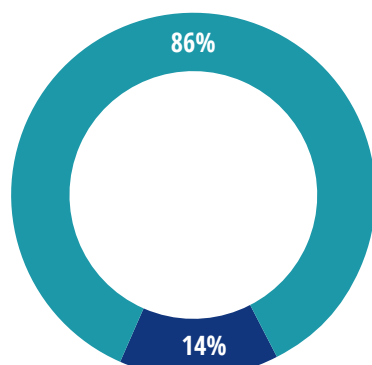
for those younger residential consumers who were found more likely to be open to change. Combining new technology with better information is also becoming more common. Fourteen percent of residential consumers surveyed use a software app for energy management, and 22 percent of them consult the app daily (figure 10). Determining who those consumers are and targeting them through the app for other services that fit their user profile could be effective. Energy management tips and monitoring actual household energy consumption are the top reasons for app usage across generations. Millennials use apps more (18 percent overall) than other generations, and more frequently (figure 10).

FIGURE 10

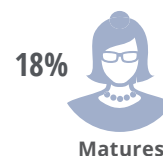
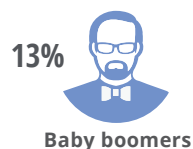
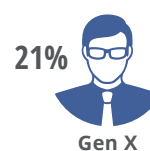
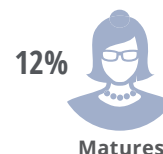
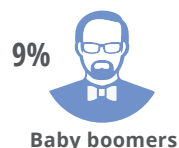
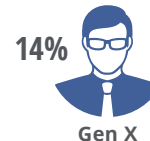
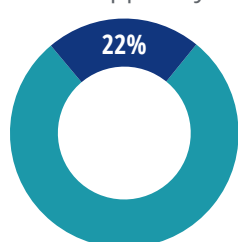
Millennials are the most frequent users of apps for energy management

■ Yes ■ No

Use software app for energy management



Use app daily



Source: Deloitte Resources 2019 Study survey results.

A missed opportunity to leverage communications is evident in several areas—for instance, demand response (DR) programs. The number participating in DR programs is consistent with prior years at a little over one in 10 of those surveyed (14 percent in 2019), and lack of awareness that DR programs are offered by providers is the primary hurdle to participation (56 percent).

So, what are some of the opportunities that may be opened up for residential consumers and for providers through better communication strategies?

- **Solar.** Although residential solar penetration is reported at about 8 percent nationally by the survey and interest in installing panels is down across all age cohorts, interest is consistently strongest among Gen X and Millennials, which suggests electricity providers might consider segmenting and targeting residential consumers by generation. In addition, the top three motivations for installing solar panels among those who are interested are the potential to save on electric bills, the reduced carbon footprint of solar power, and potential resiliency during an outage (figure 11). The top barrier to solar installation consistently cited is expense, selected by 44 percent of respondents in 2019. The second most frequently cited barrier, by 21 percent of our sample, remains uncertainty that panels would work as promised. This presents a clear opportunity for better communication about the benefits of solar panels as well as the cost and financing options, particularly if targeted at younger generations.
- **Storage.** Among residential consumers who have not yet installed solar panels, roughly half of those surveyed stated that they would be interested in combining solar panels with a battery storage unit. But the top barrier for those who are not interested, even above cost, is that they're not sure of the benefits of solar-plus-storage (34

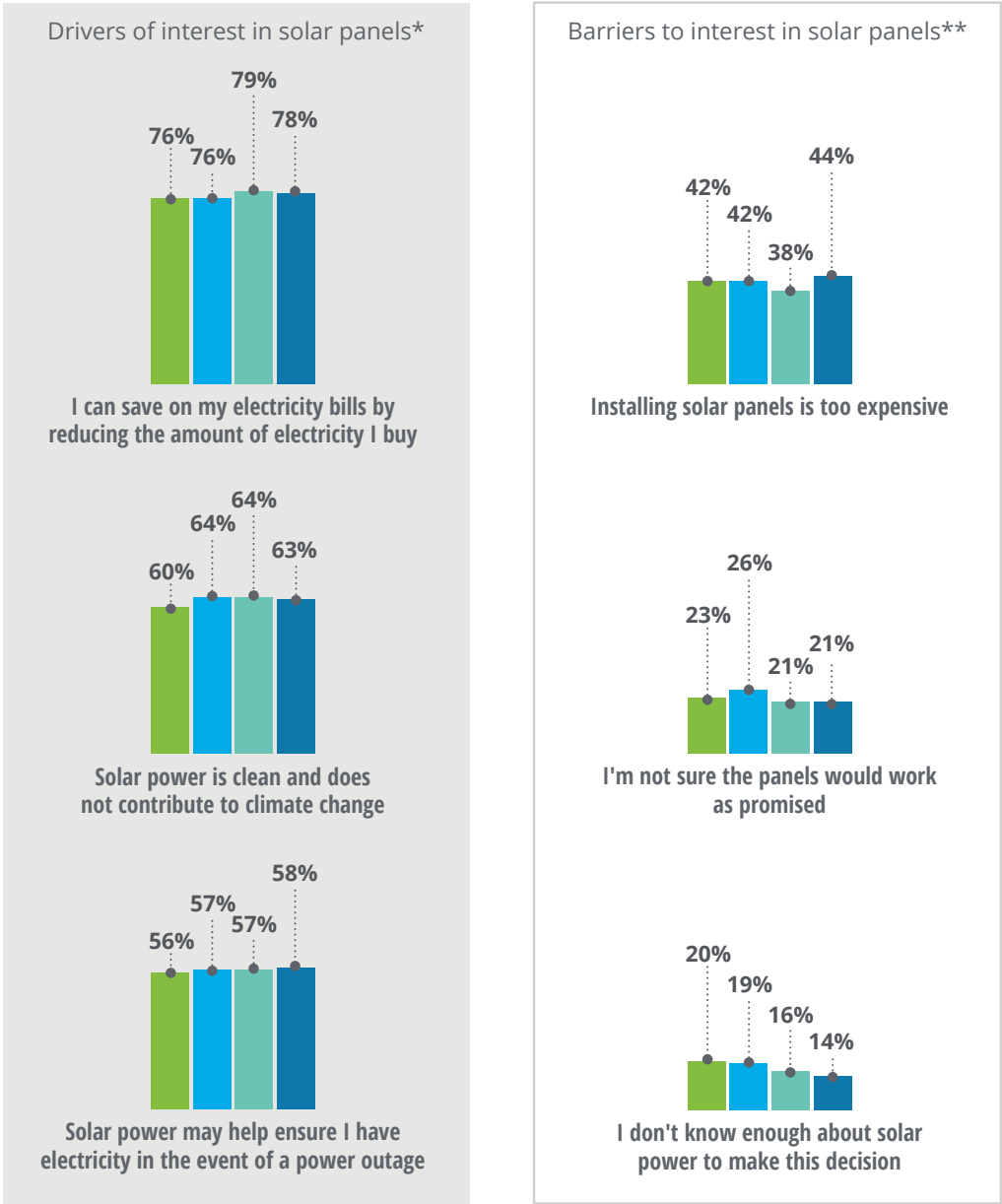
percent). Cost is the second biggest barrier (32 percent). Clearer communications explaining the benefits of solar-plus-storage could potentially increase interest, especially in areas where the cost and overall value proposition make sense (for example, in regions with high electricity prices and potential for prolonged outages due to extreme weather or climate events).

- **Demand response.** Given the lack of awareness of DR mentioned above, there may be an opportunity for providers to increase participation with better communications, particularly since the top service residential consumers say they want from their provider is energy efficiency. Here again, younger cohorts expressed keener interest in DR participation (19 percent of Millennials).
- **Time-of-use rates.** Younger generations are generally much more interested in this option (with 52 percent of Millennials expressing the most interest, compared to only 35 percent of Matures). Here is a clear example of where segmenting and targeting customers appropriately with the right messaging could be important for electricity providers.
- **Simple energy conservation.** There are some simple tactics residential consumers aren't doing now in large numbers, but that they plan to do in the future—and service providers could potentially “nudge” them to act on this intention with targeted messaging and offers. These include installing a timer on water heaters that turns them off at night/sleeping hours (8 percent doing it now and 24 percent plan to do it within five years) and getting a smart energy application to control and reduce energy consumption (10 percent doing it now and 22 percent plan to do within five years).

FIGURE 11

Top drivers and barriers to interest in solar panels

■ 2016 ■ 2017 ■ 2018 ■ 2019



*Among those interested in installing solar panels on their primary residence.

**Among those not interested in installing solar panels on their primary residence.

Source: Deloitte Resources 2019 Study survey results.

Residential consumers are seeking more options, and the more providers can analyze their customer databases; segment customers according to demographics, preferences, and behaviors; and deliver targeted offers via the appropriate channels, the more residential consumer responses will likely improve. The survey results show Millennials are more concerned about climate change, using clean energy, exploring new technologies, and communicating about these issues and options through social media than other age cohorts. These findings point toward targeting them for new services via social media. Yet even more precise targeting is possible and would enable electricity providers to target the most receptive customers across all age cohorts. The “new normal” from other industries such as

consumer goods and entertainment—where companies analyze individual consumer behaviors and preferences using advanced analytics and artificial intelligence (AI) to generate highly customized and targeted messages and offers through consumers’ preferred channels—still has not been widely adopted by electricity providers. Moving in that direction could help pull residential consumers out of their current inertia, in which cost concerns and complexity may be leading to complacency.

Other industries have shown the power of communications in driving and enabling behavioral change. Electric utilities may be on the verge of prioritizing this approach too—or perhaps newer, nontraditional providers will show them the way.

Businesses move full speed ahead

UNLIKE RESIDENTIAL CONSUMERS, businesses don't perceive a choice between climate and cost. They see value in managing energy use and moving to cleaner energy sources. Green (resource management strategies) leads to green (financial gain). They've found that implementing resource management strategies helps to create value—by saving money, reducing risk, boosting resilience, and delivering what customers want. Their actions are significantly driven by climate issues, as reflected in their strong response to recent climate reports. Partly in response to these concerns, many are taking energy management to the next level, with more setting resource management goals, formalizing them, and linking them to employee compensation. And as they meet goals, they're raising the bar and setting goals in additional resource areas—from electricity and natural gas usage to reducing their carbon footprints. This year, we see a particularly strong surge in goals to reduce water usage.

Businesses are also propelled by the substantial momentum they've achieved already. They've been successful, and success begets further success.

Businesses are propelled by the substantial momentum they've achieved already. They've been successful, and success begets further success.

Unlike residential consumers, for businesses, there are few barriers and little complacency; many are all

in and it seems to be getting easier for them. Their strategies and tactics are becoming more sophisticated and mature on many levels: they have more knowledge, better tools, and higher levels of engagement across the organization. And these gains aren't limited to the larger companies—mid-sized and smaller companies are also making progress.

Like residential customers, businesses continue to take the simpler, more basic actions to manage energy use. But they are also building in diversity, resiliency, and sustainability by turning increasingly to on-site generation. And they continue to respond to consumers' desire for more renewable energy with efforts to procure, build, or otherwise source renewable generation.

Green means green, and it's the "right thing to do"

Residential consumers may be conflicted when it comes to climate versus cost concerns, but businesses are clear. They see a connection between green (resource management programs) and green (financial gain). And more than ever, they see energy procurement as a way to create value, not as a cost. They manage resources to save money, but also because it's the "right thing to do." Climate issues are a significant driver of their actions and have motivated many to up the ante in their commitment to resource management.

This year's survey saw a noticeable jump in the percentage who view energy procurement as an opportunity to reduce risk, improve resilience, and create new value, rather than as a cost—rising to nearly nine in 10 (88

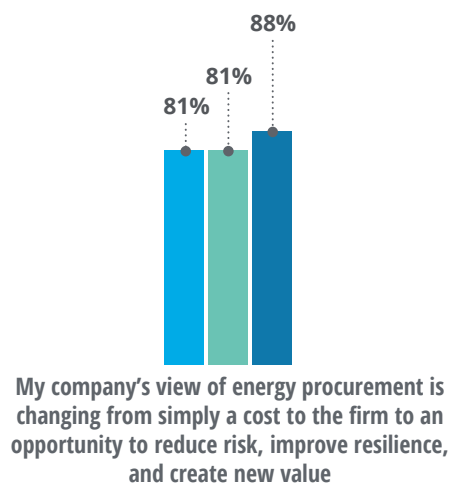
percent) from 81 percent in prior years (figure 12). This may be related to consistent efforts to procure more renewable energy in response to customer demand, and to publicize these efforts, as discussed later in this report.

While the desire to cut costs is the No. 1 driver for resource management programs, cited by half of business respondents (figure 13), just the “right thing to do” rose 11 points to second place, at 39 percent, demonstrating that economics and sustainability together are a powerful motivator. In addition, external incentives rose to third place this year, at 31 percent. Tax credits and other incentives to save energy, retrofit buildings and equipment, and procure renewables have been in place for many years, and corporate energy managers are becoming more savvy about using them. Resource management decision drivers selected in the top 3 by a quarter or more of respondents are illustrated in figure 13.

FIGURE 12

Energy procurement seen as creating new value, not cost

■ 2017 ■ 2018 ■ 2019



Source: Deloitte Resources 2019 Study survey results.

FIGURE 13

Economics and sustainability dominate top resource management drivers

Resource management decision drivers	2016	2017	2018	2019
Desire to cut costs	55	54	45	50
Just the “right thing to do”	36	33	28	39
External incentives (e.g., tax credits)	28	32	24	31
Employee motivations	30	27	24	29
Future regulatory requirements	24	27	28	28
Competitive advantage	30	27	26	27
Part of broader corporate social responsibility program	26	27	25	26
Current regulatory requirements	24	27	21	25

Source: Deloitte Resources 2019 Study survey results.

A pair of climate reports issued in late 2018 may also be driving businesses' focus on doing "the right thing." More than eight in 10 respondents were aware of reports from the US government and the Intergovernmental Panel on Climate Change (IPCC) in late 2018 containing some of the gravest assessments and warnings about climate change yet (see details in endnotes).⁴ And many businesses were influenced by those warnings: Nearly two-thirds of those familiar with the reports reviewed or changed

their energy management strategies in response, and 83 percent of those who reviewed their strategies increased their commitment and investment in energy management (figure 14).

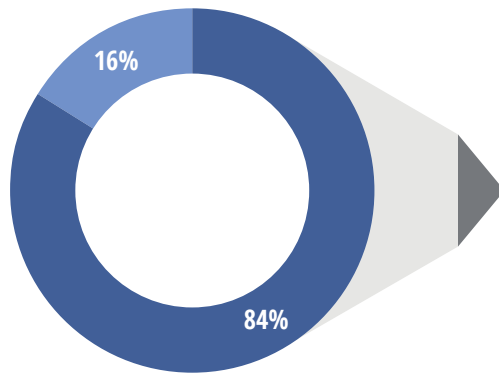
One of many signs of this increased commitment is that more companies are setting resource management goals, often in multiple resource areas, with a new emphasis on water. And most goals are more ambitious than ever, with more commitment behind them. The portion of companies setting

FIGURE 14

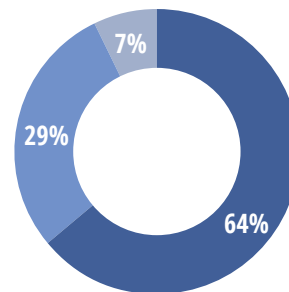
Climate reports boosted commitment and investment in energy management

■ Yes ■ No ■ Not sure

Aware of recent climate change reports*



Reviewing/changing energy management in response to recent climate change reports



How did this affect your energy management initiatives?



*Respondents were asked if they were aware of recent climate change reports, including the US government's Fourth National Climate Assessment that said climate change will harm human health, damage infrastructure, limit water availability, alter coastlines—and cost the US economy billions of dollars by the end of the century, and the Intergovernmental Panel on Climate Change's (IPCC) 2018 report warning that the world is not acting fast enough to avoid the worst climate impacts and time is quickly running out. Those who answered yes were asked if they had reviewed or changed their energy management initiatives in response and those who had were asked how it affected their initiatives.

Source: Deloitte Resources 2019 Study survey results.

resource consumption goals has risen significantly since 2016, with water gaining the most ground. While electricity is on top, with nine in 10 reporting goals to reduce electricity consumption, businesses with water-saving goals rose from 59 percent in 2016 to 75 percent in 2019 (figure 15). Increasing water conservation goals are not surprising, as water rates rose at an annualized rate of 5.05 percent, more than double the rate of inflation from 2014–2018.⁵

Due to their more substantial and typically more varied footprints, large and mid-cap companies are more likely to have goals in multiple resource areas than smaller companies. For example, at least

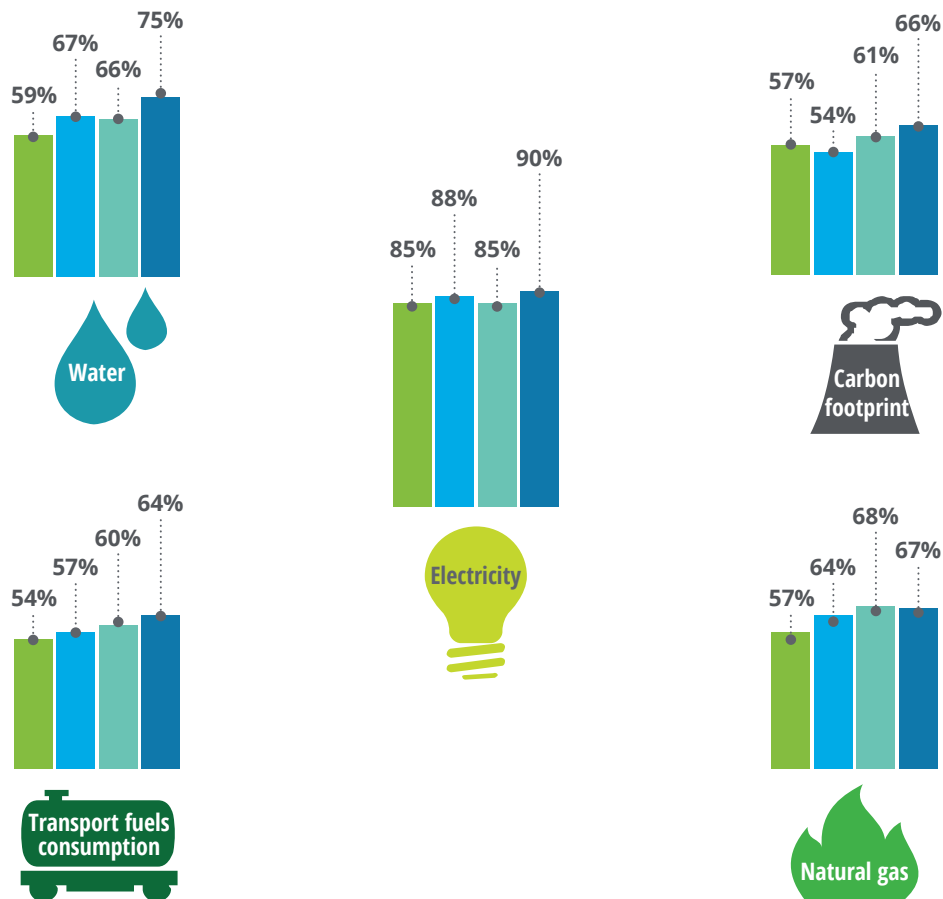
two-thirds of large companies surveyed have goals in each of the five areas listed in figure 15. For the most commonly targeted resources, electricity and water, 92 percent and 78 percent of large companies, respectively, have goals to reduce consumption of these resources. This indicates the likelihood that most large companies have goals in multiple resource areas.

At the same time, targeted reduction levels across the five resource areas, at 28–30 percent in 2019, have been trending higher since 2017 (figure 16), and the portion of companies with targets exceeding 25 percent is the highest ever. In 2019, more than

FIGURE 15

Companies are increasingly setting resource management goals

■ 2016 ■ 2017 ■ 2018 ■ 2019



Source: Deloitte Resources 2019 Study survey results.

40 percent of businesses reported targeting more than a 25 percent reduction across all resources and 50 percent of businesses are aiming for more than a 25 percent reduction in transport fuels consumption. Average time horizons businesses project to

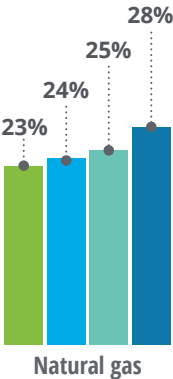
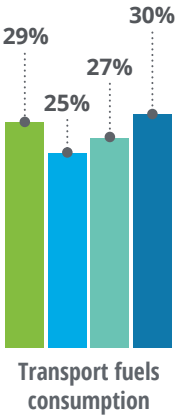
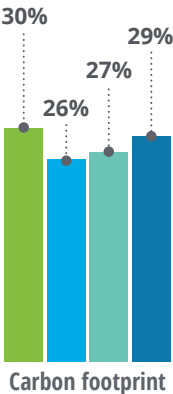
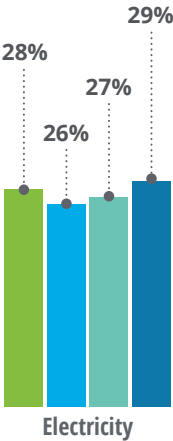
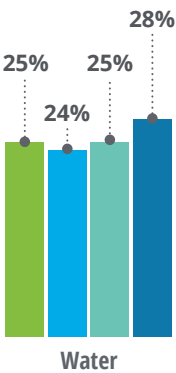
accomplish these reductions have been consistent, reported at four to five years, but as goals become more ambitious over similar time spans, they assume faster progress.

FIGURE 16

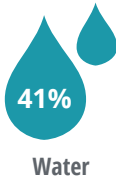
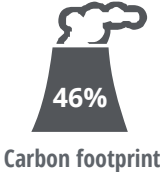
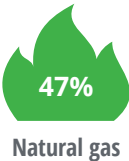
Targets for reducing resource consumption are increasing

■ 2016 ■ 2017 ■ 2018 ■ 2019

Average targeted level of reduction by resource



% of respondents targeting >25% reduction in these resource areas (2019)



Source: Deloitte Resources 2019 Study survey results.

Sophistication is rising—and bringing success

Businesses are continuing to become more sophisticated and mature in their energy and resource management strategies, and their efforts appear to be paying off. Success is becoming easier and is spreading to mid-cap and smaller companies. Those reporting that their company has become more sophisticated in managing its energy consumption rose to the highest level ever, at 85 percent in 2019 (figure 17). And it's getting a little easier.

For example, the percentage of respondents who think cutting electricity consumption initially is relatively easy rose to more than eight in 10, while those who find it hard to keep up with financial incentives, while still significant, fell below two-thirds to 65 percent.

In some ways, small and mid-cap companies are having an easier time than larger companies.

They're reporting less difficulty monitoring performance year over year, and in comparison to large companies. For small businesses in particular, only 22 percent of respondents find it extremely or very difficult to monitor their performance, down 10 percentage points from 2018. For mid-caps, just 21 percent reported great difficulty this year, compared with 28 percent in 2018. A quarter of the respondents from large companies reported a high degree of difficulty, which was slightly higher than

Success is becoming easier and is spreading to mid-cap and smaller companies.

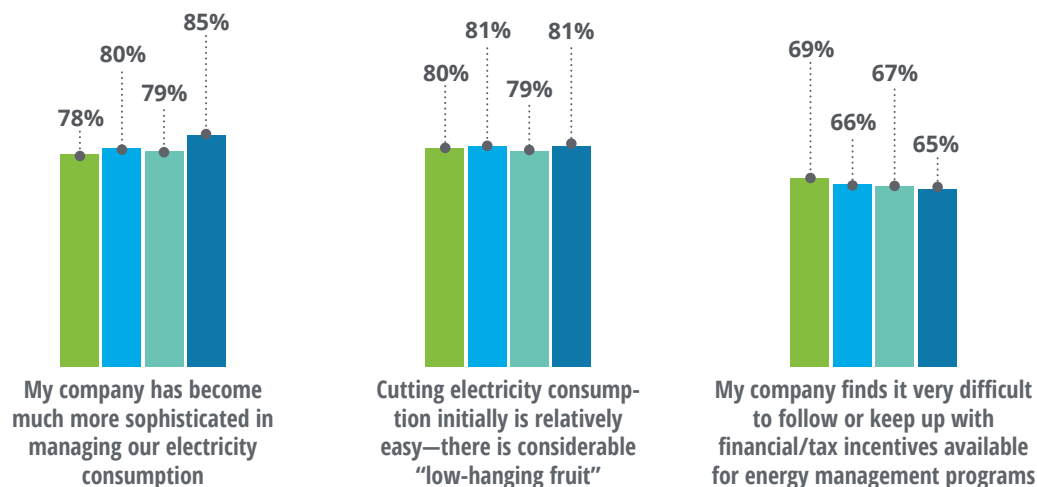
2018. Mid-caps are also finding employee participation less challenging than larger companies—53 percent of mid-cap respondents report difficulty with employee engagement in resource management activities compared with 58 percent of large companies.

FIGURE 17

Businesses have become more sophisticated in managing electricity consumption

■ 2016 ■ 2017 ■ 2018 ■ 2019

Agree/strongly agree



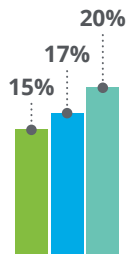
Source: Deloitte Resources 2019 Study survey results.

FIGURE 18

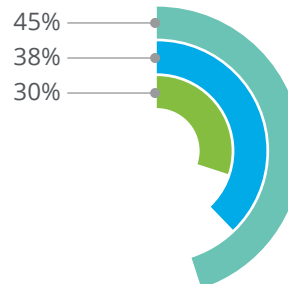
Sophistication brings greater reductions in electricity use

■ 2016 ■ 2017 ■ 2018

Average annual reduction in electricity consumption



% that reduced electricity consumption >15%



Source: Deloitte Resources 2019 Study survey results.

As they're getting better at it, we're seeing the highest perception of success ever in the survey, with almost six in 10 (59 percent) feeling extremely or very successful at achieving their resource management goals, up from the mid-fifties in recent years. Part of the reason may be that, unlike residential consumers, most businesses see few barriers to success and many have analytical tools to measure it. While challenges related to staffing, funding, and internal hurdles are noted by less than a quarter of respondents, only one barrier is cited by more than a quarter—the length of time required for investments to pay off—with 27 percent citing this as a barrier to achieving resource management goals. One barrier that dipped significantly in 2019 was regulatory uncertainty, dropping from the 23–25 percent level in 2016–18 to just 18 percent in 2019. This may reflect general perceptions of regulatory easing in recent years.

The survey data backs up businesses' perceptions of success, with greater reductions in natural resource use across the board in 2019, particularly in electricity consumption. Businesses reported reducing electricity usage on average by 20 percent in 2018, up from 15 percent two years earlier (figure 18). And those who reduced electricity use by more than 15 percent in the prior year rose to 45 percent for 2018 compared with 30 percent for 2016.

Economics, sustainability, and success are leading businesses to up their game

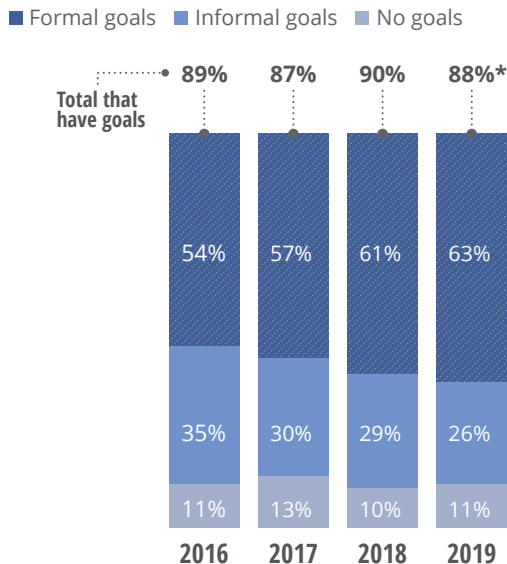
While economics and sustainability are some of the key motivators for businesses' resource management programs, repeated success may be pushing them to reach even higher. Businesses are compounding their commitment to resource management strategies, most notably by formalizing goals and incorporating them into employee compensation, integrating energy strategy into capital planning, and allocating more resources and effort overall to energy management.

A rising percentage of those surveyed report having formal resource management goals, jumping nine points from 2016 to 63 percent in 2019, with a corresponding drop in the portion who report informal goals. Overall, about nine in 10 companies report having resource management goals (figure 19).

In another indication of commitment, businesses are increasingly tying their resource management goals to employee compensation, with nearly half (48 percent) of businesses surveyed reporting that leadership and staff at all levels have energy objectives incorporated into goals, the highest level ever, compared to studies in prior years (figure 20).

FIGURE 19

More businesses are setting formal resource management goals



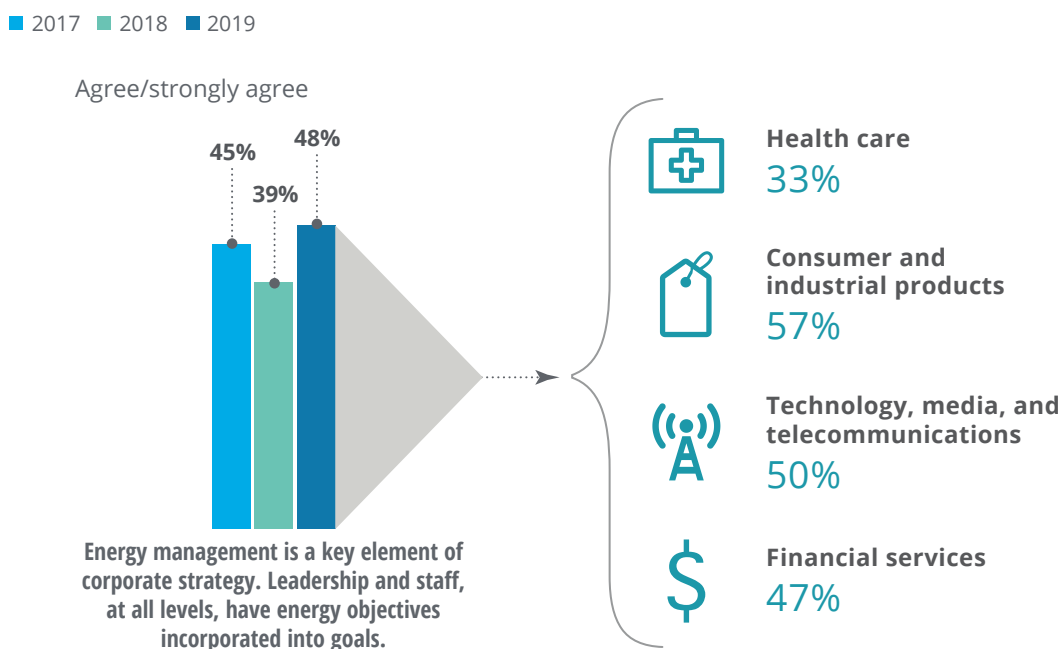
*Numbers may not add up to 88 due to rounding.
Source: Deloitte Resources 2019 Study survey results.

Among business sectors surveyed, the consumer and industrial products sector leads in this aspect, with 57 percent reporting tying energy objectives into employee goals (figure 20). At the senior level, two-thirds of respondents across industry sectors say half or more of their company's senior management has energy management/metrics as part of their key performance indicators, up from 58–65 percent in the prior two years.

More businesses report incorporating energy management into their capital programs as well, with requirements that all capital planning align to energy strategy as part of the business case rising to 42 percent of respondents in 2019 compared with 37 percent in the two prior years. And overall, there was a strong increase in degree of effort and resources allocated to energy management over the last three calendar years, with 67 percent of respondents rating it four or five (out of five) for calendar year 2018, compared with 39 percent for 2016 (figure 21).

FIGURE 20

Businesses are increasingly tying energy objectives into employee goals

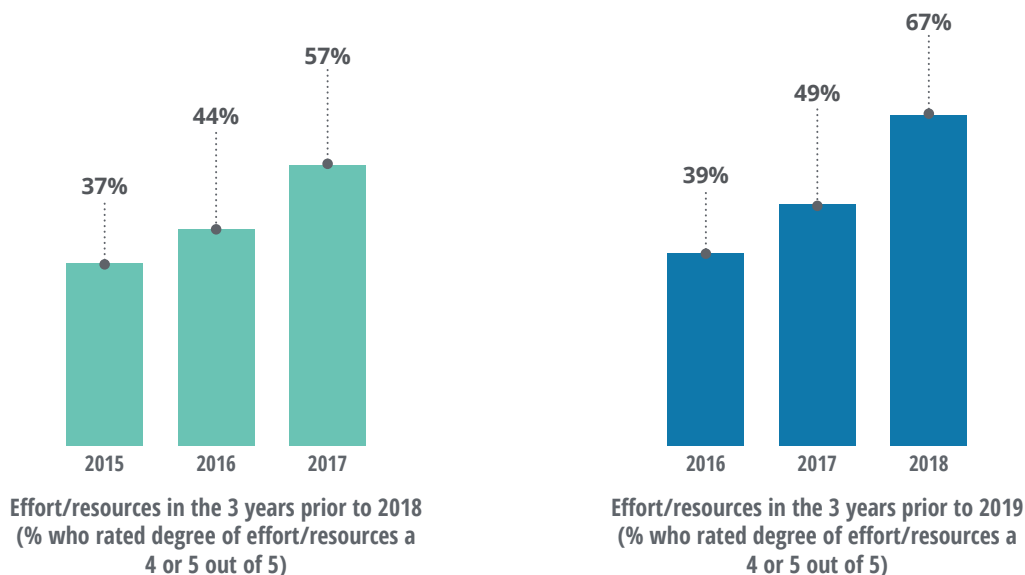


Source: Deloitte Resources 2019 Study survey results.

FIGURE 21

Effort and resources allocated to resource management rising sharply

■ 2018 ■ 2019



Source: Deloitte Resources 2019 Study survey results.

In addition, percentages were up sharply from respondents' assessments in 2018 of their efforts during the three years prior to that (2015–17).

Cutting electricity use is still in the bullseye

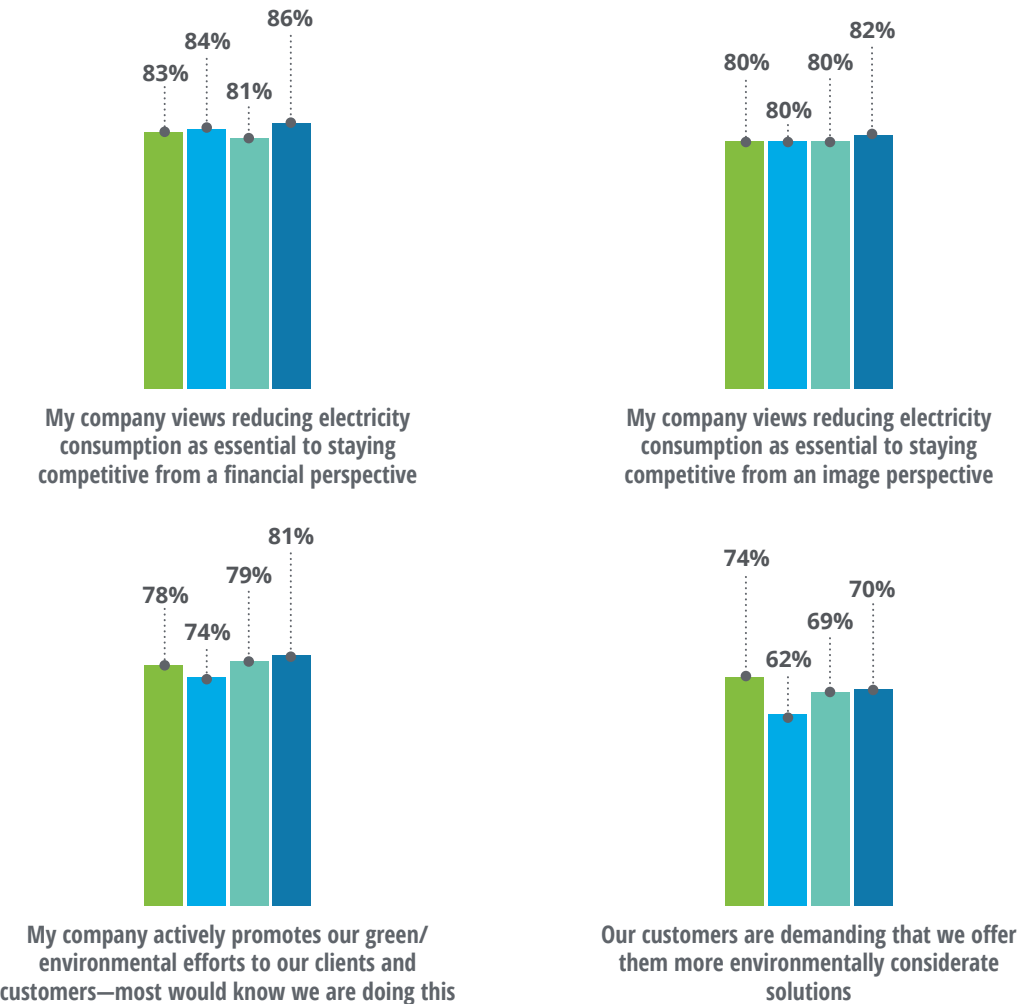
While businesses are expanding resource management goals across multiple resources, reducing electricity consumption continues to be the centerpiece of most of their strategies. Nine in 10 businesses surveyed report having goals to cut electricity use, and they're finding more reasons to do it and becoming more flexible in their approach. From staying competitive financially or from an image perspective, to active promotion of environmental efforts, and responding to customer demand for more environmentally considerate solutions,

businesses rated motivators for reducing electricity consumption higher than previous years surveyed (figure 22). Adding to their motivation to cut electricity use is that more than a quarter of respondents (27 percent) see electricity rates rising 3–5 percent in the next one to two years, and 37 percent stated they believe they will rise more than that.

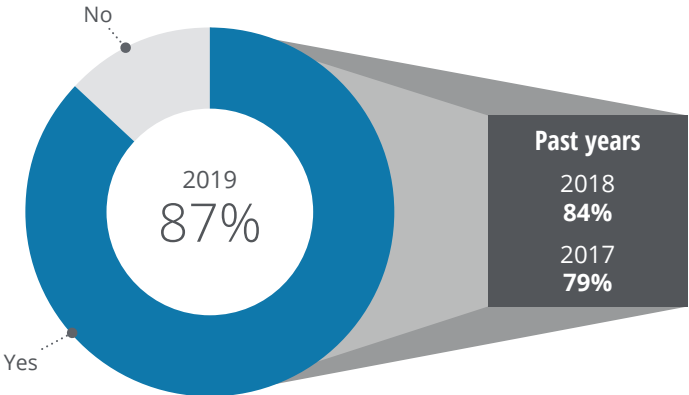
Businesses are increasingly willing to be flexible in their approach to managing electricity consumption, with a significant spike in those participating in utility DR programs. Nearly nine in 10 (87 percent) reported that they participated in DR programs at least occasionally, if available—up from 79 percent in 2017. And those respondents who participate in all available programs rose eight points year over year, to 29 percent. This applies across all business sizes, rising nine points for both large and mid-cap organizations to 34 and 27 percent, respectively, and 7 points for smaller companies to 25 percent.

FIGURE 22
Businesses are finding more reasons to cut electricity use than ever

■ 2016 ■ 2017 ■ 2018 ■ 2019



Demand response participation is rising
Participate in available demand response programs occasionally or more often:



Source: Deloitte Resources 2019 Study survey results.

On-site generation is gaining steam

Like residential consumers, businesses favor the simpler, basic tactics to manage electricity use. But they're also looking to build energy diversification, resilience, and sustainability by turning increasingly to on-site generation. Businesses' electricity management tactics track consistently with prior year surveys, with a slight uptick in installing electricity generation solutions (figure 23). The tactics rated most important range from the relatively simple approach of using timers and sensors to control when equipment is powered on, to more costly or

complex tactics such as installing building energy management systems and on-site power generation systems.

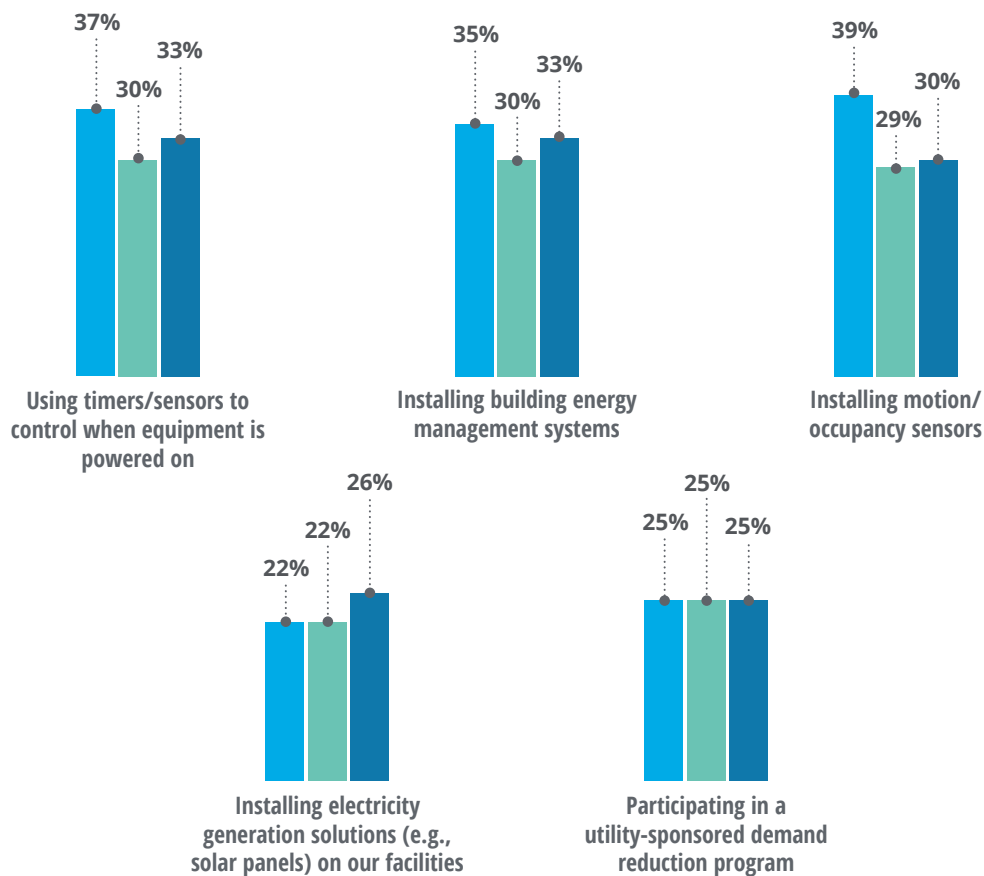
The overall percentage of businesses reporting that they have on-site generation was consistent with recent years, at 57 percent, with most sectors close to that average level, except the health care sector at 62 percent (figure 24). This is not surprising given the critical nature and reliability requirements of health facilities. By 2021, respondents who are generating electricity on-site expect to source less electric power from electric companies, falling from 40 percent of power consumed in 2018 to 35 percent of power consumed in 2021. They expect to

FIGURE 23

Businesses' energy management tactics range from basic to more complex

Rated as the three most important tactics being used

■ 2017 ■ 2018 ■ 2019



Source: Deloitte Resources 2019 Study survey results.

replace this electric power primarily with increased supplies from on-site renewable generation, offsite renewables, and on-site cogeneration.

The top three reasons cited for installing on-site generation were diversification of energy supply, cost savings (up sharply), and price certainty (figure 24). The percentage of respondents who selected “to meet sustainability goals,” while

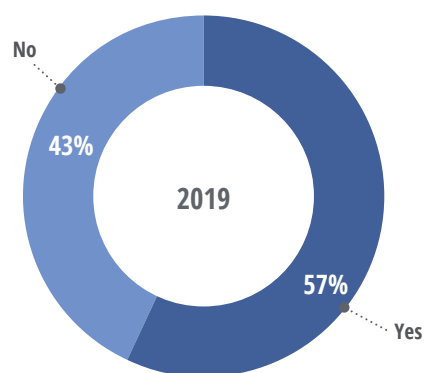
at the bottom of the list, spiked nine points, from 17 percent to 26 percent. Resiliency also rose year over year as a factor, from 34 percent to 37 percent; increased resiliency concerns may be partly due to the impact of extreme weather events (see sidebar, “Resiliency and reliability—table stakes for electricity providers”).

FIGURE 24

Diversification, savings, and certainty motivate on-site generation

■ 2018 ■ 2019

Have on-site electricity generation



Health care

62%



Consumer and industrial products

59%



Technology, media, and telecommunications

58%



Financial services

54%

Reasons for on-site generation

Diversification of energy supply



Cost savings



Price certainty



Resiliency



To meet sustainability goals



Source: Deloitte Resources 2019 Study survey results.

More renewable energy, please

Businesses continue to respond to consumers' desire for more renewable energy with efforts to procure, build, and otherwise source renewable generation. About two-thirds of respondents say their customers are demanding that they procure a certain percentage of their electricity from renewable resources, and a rising portion of businesses actively publicize their sourcing of renewables (figure 25). Businesses surveyed in the consumer and industrial products sector report the highest incidence of customer demand to procure renewables, and publicize their efforts the most (figure 25).

As a result, about half of the respondents (47 percent) report that they're working to procure

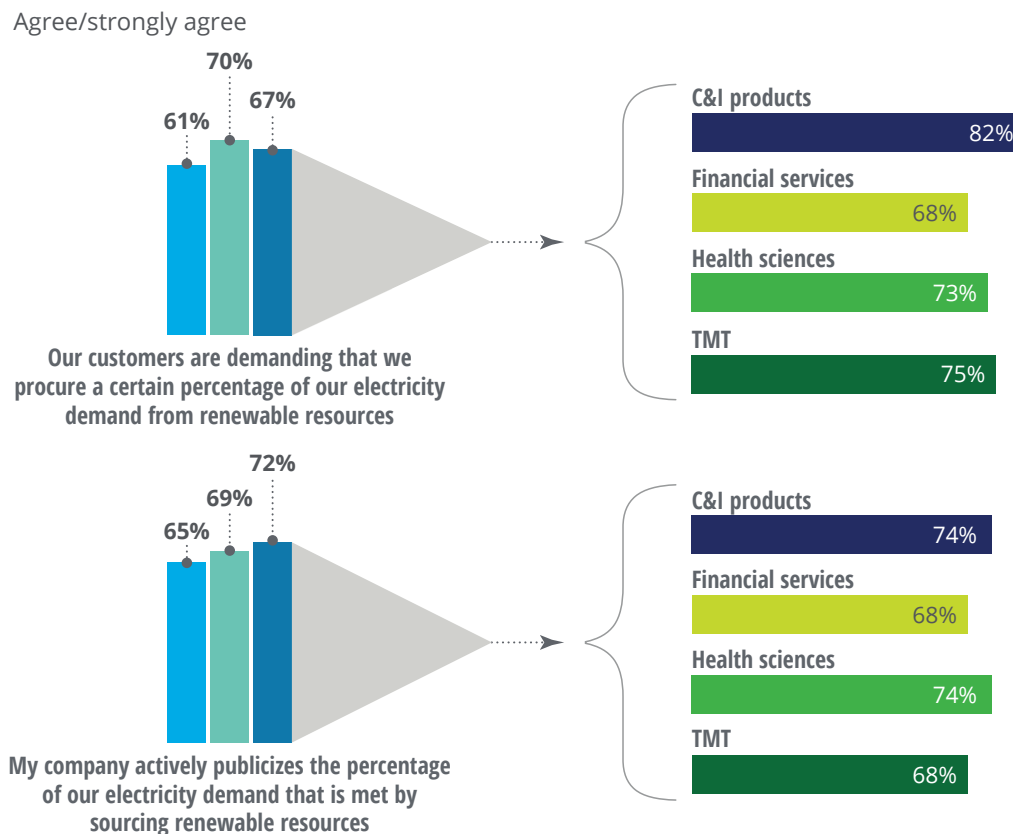
more electricity from renewable sources, consistent with recent years. Most respondents procure renewables through traditional or virtual power purchase agreements.

What would make renewables more attractive? Energy storage. Of those who are not working to procure more renewable energy, 65 percent of respondents said they could be motivated to do so by combining renewable energy with battery storage to provide backup generation and/or to improve the economics of the overall system. This rose from 61 percent in 2018, indicating growing interest in the benefits of battery storage, in line with the declining prices and increasing deployment of battery storage that we're seeing in the market.

FIGURE 25

Businesses respond to customer demand for renewables, and publicize their efforts

■ 2017 ■ 2018 ■ 2019



Source: Deloitte Resources 2019 Study survey results.

SMART EVERYTHING? BUT WHAT ABOUT CYBER RISK?

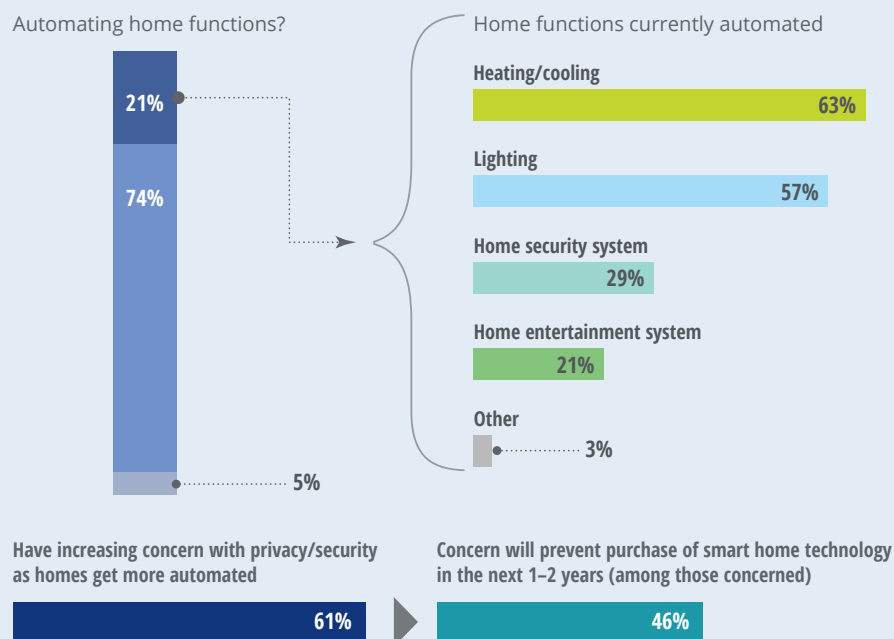
The rise of smart, connected technology in the home and in businesses can bring enormous benefits in terms of efficiency and autonomy in energy use as well as many other services, and bundling these together in interconnected systems is very often seen as a winning value proposition. But there is a downside—wherever systems are interconnected, there is some risk of cyber intrusion or cyberattack, compromising performance integrity or leading to loss of user data. Our survey looked at customer perceptions of these risks, both in the residential and business segments. Will they slow down adoption of otherwise useful technologies and systems?

On the residential side, home automation is at an early stage of deployment—only two in 10 survey respondents say they are adopting it, mainly for heating and cooling (63 percent), followed by lighting (57 percent) (figure 26). But there are signs that adoption is accelerating, with a doubling since 2016 of home device connectivity with smartphones. Millennials are more likely to use home automation than older cohorts. But 61 percent of active users are increasingly concerned about privacy and security, while 46 percent of residential consumers surveyed say that these concerns will prevent them from purchasing smart home technology (figure 26). And 39 percent of household respondents link cyber risk with concerns about power outages.

FIGURE 26

Increasing home automation brings greater concern about privacy and security

■ Yes ■ No ■ Not sure



Source: Deloitte Resources 2019 Study survey results.

Perhaps because of more experience with operating complex IT systems, businesses seem even more aware and concerned about cyber risk than households. Roughly half of respondents (49 percent) express concern about interruption to their company's electricity supply due to a cybersecurity event involving their electricity supplier or the electric grid (figure 27). Large companies are the most aware, at 55 percent of respondents surveyed, while 46 percent of smaller companies share these concerns. And, lacking awareness, smaller companies may also lack the resources and know-how to put in place effective cyber risk mitigation or recovery protocols.

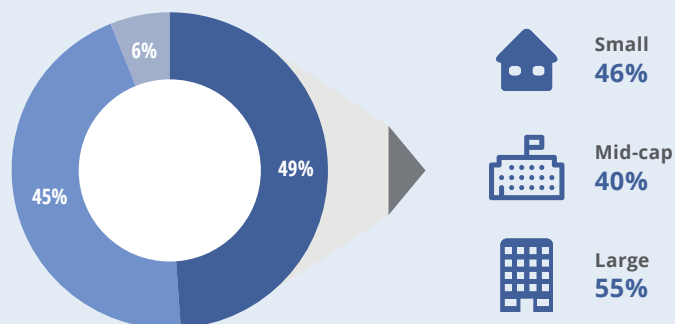
The message for electricity providers and technology developers is to consider explicitly integrating cyber protection assurances in the value proposition of the products and services they offer.

FIGURE 27

Nearly half of the businesses surveyed are concerned about cyber risk to electricity supplies

Concern about cybersecurity interruptions to your electric supplier or on the electric transmission or distribution grid

■ Yes ■ No ■ Not sure



Source: Deloitte Resources 2019 Study survey results.

ELECTRIC VEHICLES—AWARENESS, COMMITMENT, OR DEPLOYMENT?

The entry of electric vehicles (EVs) on the market over the past few years has garnered many headlines, and actual sales are accelerating (with over 380,000 units sold in 2018, on-road electric vehicles now top 1 million in the United States).⁶ So how is increased visibility of EVs translating into perceptions and adoption plans?

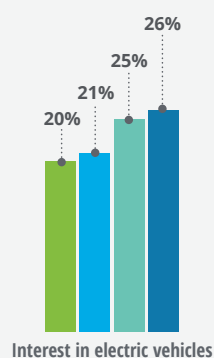
Firstly, residential respondents are showing significant interest and intent. More than a quarter (26 percent) say they are extremely or very interested in purchasing an EV (figure 28), and 11 percent of respondents actually plan to replace their current vehicle with an EV, both more favorable responses than in recent survey years. But their concerns about factors such as cost (44 percent), range (26 percent), and recharging convenience (29 percent) may still be hindering faster growth for now. As we might expect, if gasoline prices were higher, interest in EVs would likely rise for about 44 percent of residential consumers—and about 55 percent of Millennials.

FIGURE 28

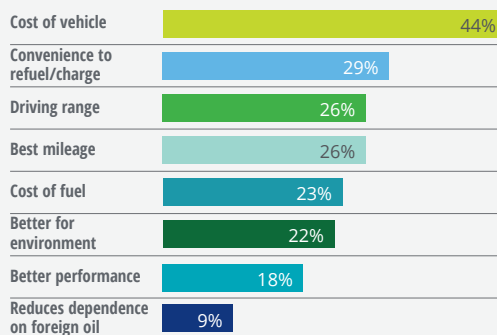
Consumer interest in EVs is rising slowly as key barriers persist

■ 2016 ■ 2017 ■ 2018 ■ 2019

Extremely/very interested



Factors that drive preference for vehicle type—2019



Source: Deloitte Resources 2019 Study survey results.

On the business side, the survey shows that while business intentions to purchase EVs for their fleets remain unchanged, more are making the charging stations they provide to employees available for public use. This may help boost EV adoption, especially given that range and convenience of recharging are two key barriers to consumer adoption. Key findings include:

- Businesses surveyed expect 11 percent of their transportation fleets will be battery electric vehicles (BEVs) in three years, consistent with last year's expectations.
- The percentage of respondents who say gasoline prices would impact those decisions is also consistent with 2018 data, at six in 10.
- Over half of respondents (54 percent) say their companies provide EV charging stations for employees, similar to 2018 and a step-up from 45–49 percent in 2016–17. The number is far higher in the west (63 percent), which has higher EV penetration. And, of these companies, the percentage who make them available to the public ticked up six points from 2018.

So will we see more electric vehicles on the roads in the coming years? It looks quite likely if the growing awareness and commitment responses in our survey are indicators of decision-making by individuals and businesses in the future.

RESILIENCY AND RELIABILITY—TABLE STAKES FOR ELECTRICITY PROVIDERS

Keeping the lights on is often cited as the No. 1 responsibility of electricity providers, since so much of individuals' lives and business activity depend on the power always being on, or on at the turn of a switch. But resiliency concerns appear to be rising among residential and business electric power consumers, with a perception that while outages have generally not increased, more respondents believe outages are caused by extreme weather (figure 29).

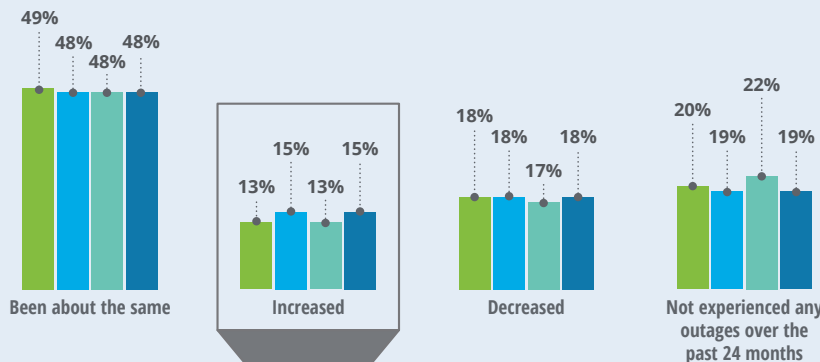
When considering their choices, from switching energy providers to installing rooftop solar and battery storage, residential consumers are motivated by reliability/resiliency (as well as cost and climate). While reported outages have generally not increased, with 48 percent saying the number has been about the same for the last few years, for the 15 percent who have seen increased outages, there are increasing perceptions that the outages are caused by extreme weather (steadily increasing from 35 percent in 2016 to 59 percent in 2019), their electric provider not adequately maintaining its system (up to 44 percent from low-to-mid 30s in prior years), or their provider not having enough capacity during peak usage periods (up to 29 percent from 21–24 percent in prior years (figure 29)). These perceptions could make consumers more open to options such as battery storage as it becomes more affordable, and these customers can be targeted for such resiliency services by the incumbent or a new entrant.

FIGURE 29

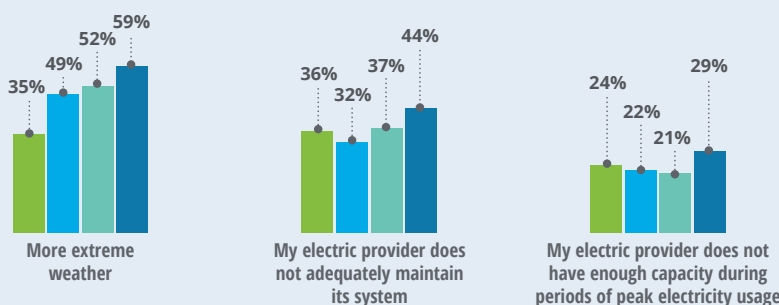
Outages have not increased for most residential consumers, but those who have experienced more increasingly blame severe weather

■ 2016 ■ 2017 ■ 2018 ■ 2019

The number of electric outages has:



Reason for increase in electric outages:



Source: Deloitte Resources 2019 Study survey results.

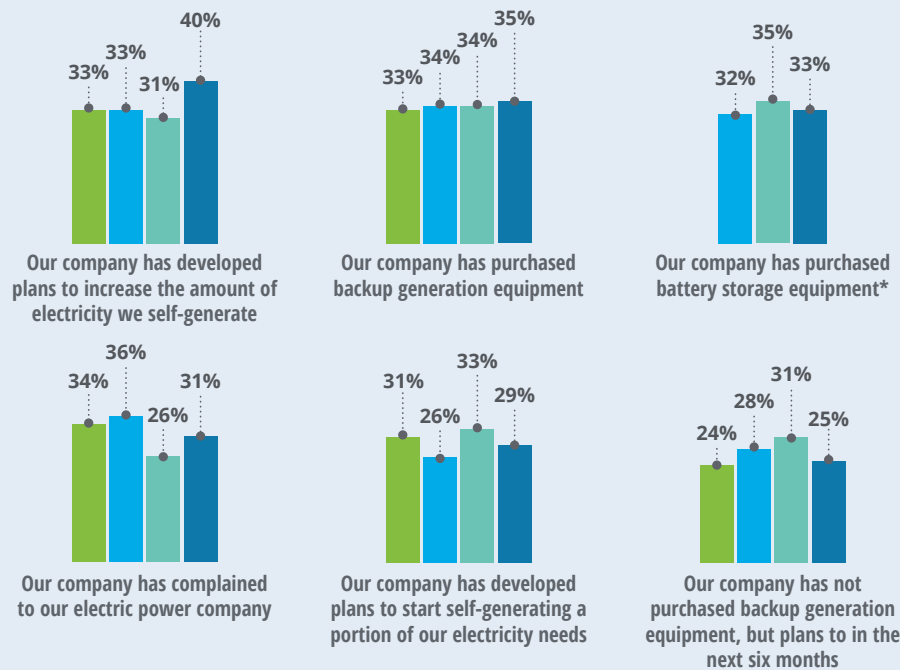
Businesses surveyed perceive both the frequency and duration of outages in the past two years to have remained the same or to have dropped slightly. But more are blaming those outages on extreme weather than previously (53 percent in 2019, compared to 39–47 percent in 2016–2018), and those with self-generation are increasing the amount they plan to generate—perhaps in an effort to boost resiliency (figure 30). And the portion of respondents saying their company has developed plans to increase the amount of electricity they self-generate has spiked to 40 percent, compared with 31–33 percent in 2016–2018.

FIGURE 30

On-site and backup generation are increasingly common responses to outages for businesses

Steps taken due to increase in outages (among those that have experienced increase in outages)

■ 2016 ■ 2017 ■ 2018 ■ 2019



*Option added in 2017.

Source: Deloitte Resources 2019 Study survey results.

Concluding insights

THE FINDINGS OF the 2019 Study reveal similarities and contrasts between the business and residential consumer segments' attitudes toward energy management. Both groups are significantly motivated by climate concerns, with goals to reduce energy use and move to cleaner energy sources. And both are also driven by the need to manage costs and ensure reliability, resiliency, and security. But beyond that, they differ. For businesses, there's no conflict among these drivers. They're able to balance climate and costs; they can conserve resources and choose more climate-friendly energy sources while still creating value. They've reached new levels of success and are boosting their goals. In contrast, residential consumers, while similarly intentioned, often seem unable to balance climate and cost concerns with the choices available to them. Beyond the basic tactics they've employed in recent years, they perceive the need to spend more money or time to save more electricity or switch to cleaner sources. So they're stuck in a holding pattern. Whether it's lower costs, new options, or better communication about those options, something will likely have to change before residential consumers can make further progress.

What does this mean for electricity providers?

The mantra "understand your customer" applies now more than ever. When serving the business segment, it means knowing they continue to be motivated by reliability, affordability, and, increasingly, environmental responsibility. And as energy management goals are increasingly integrated into corporate strategies, businesses are willing to invest to meet these goals. Not just large companies, but mid-cap and smaller businesses too. However, their

options are expanding, and some of those choices may involve opting for alternative providers, or generating and/or storing electricity themselves. For electricity providers, harnessing their core competencies to offer flexible, customized services that address individual businesses' needs may be more important than ever.

On the residential side, consumers need simpler, more affordable options, and clearer, more targeted communications to help move them off the mark. Millennials and younger cohorts are among the most likely candidates for clean energy and technology solutions based on survey responses. But electricity providers could also take a cue from companies in other sectors and use advanced analytics and AI to analyze individual consumers' behaviors and preferences and target them for new services. Beyond that, they could make it easier for consumers with multi-channel communications, including through smart home platforms, smartphones, smart watches, and smart speakers. Since a key barrier for consumers is lack of funds to invest in energy solutions, consider offering options such as on-bill financing to help them afford energy efficiency and renewable energy investments. And just as important, try to simplify choices for them with clear statements of costs and benefits.

What does this mean for businesses?

A growing number of businesses have taken the ball and run with it. They see resource management and green energy choices as a win-win: Doing the "right thing" by combatting climate change is good for business and they're publicizing it more than ever. For those that are already on this path, it's important to remember that the field is evolving.

New technologies, new providers, new services, and new options will likely continue to emerge and become more cost-effective. In this environment, businesses that stay well-informed will likely have a competitive edge—whether it's about new products and services, new pricing options, or new market structures. In some places, businesses may eventually have the potential to not only generate and store energy, but to transact with peers as well.

For businesses that have not yet incorporated resource management and cleaner energy sources into their corporate strategies, the imperative is growing. It's no longer just a way to please current customers and shareholders and cater to new generations, or just a way to save costs. It's both. Energy management is a win-win, and there's no time to lose.

HOW CAN YOU LEVERAGE THE DELOITTE RESOURCES 2019 STUDY?

Deloitte has designed this Study as a tool to assist companies with their business decision-making. The expansive database developed through the Study allows Deloitte to guide companies in examining the findings in much greater depth and from many vantage points. This Study can be used to help build the business case necessary to establish priorities and gain support for proposed initiatives, or it can provide solid data for new directions that are under evaluation. For more information, please email us at DeloitteResourcesStudy@deloitte.com.

Endnotes

1. As noted in the survey question, the US government's fourth National Climate Assessment said climate change will harm human health, damage infrastructure, limit water availability, alter coastlines and cost the US economy billions of dollars by the end of the century, and the Intergovernmental Panel on Climate Change's (IPCC) 2018 report warned that the world is not acting fast enough to avoid the worst climate impacts. (US Global Change Research Program, *Fourth National Climate Assessment, volume II: Impacts, risks, and adaptation in the United States*, November 2018 and Intergovernmental Panel on Climate Change, *Global warming of 1.5 °C*, October 2018.)
2. As used in this document, "Deloitte" means Deloitte LLP and its subsidiaries. Please see www.deloitte.com/us/about for a detailed description of the legal structure of Deloitte LLP and its subsidiaries. Certain services may not be available to attest clients under the rules and regulations of public accounting.
3. US Energy Information Administration, "*Electricity data browser, average retail price of electricity, residential*," accessed May 2019.
4. US Global Change Research Program, *Fourth National Climate Assessment, volume II*; Intergovernmental Panel on Climate Change, *Global warming of 1.5 °C*.
5. American Water Works Association, "Water and wastewater rate summary figures: Annualized rate increases from 2014 to 2018," American Water Works Association and Raftelis Financial Consultants, 2019. Water rates rose at an annualized rate of 5.09% from 2014–18 while the Consumer Price Index rose 2.1% annually during the same period.
6. Roland Irle, *USA plug-in sales for 2018 full year*, EV-volumes.com, accessed May 2019.

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